MA 1118 - Multivariable Calculus
Exam II - Quarter IV - AY 99-00

Instructions: Work all problems. Read the problems carefully. Show appropriate work, as partial credit will be given. Closed book. One page (one side) notes permitted. No scientific calculators.

---

1. (25 Points) a. Find the equation of the plane which passes through the point $(0, 2, 1)$ and is perpendicular to the line

$$\vec{r} = (1 - t)\vec{i} - 2t\vec{j} + (4 + 2t)\vec{k}$$

b. Find the distance from the point $(1, -1, 2)$ to the plane

$$5x - 2y + z = 10$$

---

2. (25 Points) Consider the parametric curve generated by:

$$x = \frac{1}{2}t^2$$
$$y = t$$
$$z = \frac{1}{3}(t^2 + 1)^{3/2}$$

a. Find the **direction** of the vector tangent to this curve at $t = 2$.

b. Find the arc length of this curve between $t = 0$ and $t = 3$.

---

3. (25 Points) a. Sketch and identify the conic section given by the polar equation

$$r = \frac{3}{2 - \sin(\theta)}$$

b. Convert the polar equation

$$r = \frac{3}{4\cos(\theta) - \sin(\theta)}$$

to an equation in terms of x and y and identify the curve represented by this equation.

c. Find the point(s) of intersection of the curves given in part a and part b above.

---

4. (25 Points) a. Sketch the surface defined in cylindrical coordinates by:

$$r^2 + 4z^2 = 4$$

b. Sketch the surface defined in spherical coordinates by:

$$\tan(\phi) = 1$$